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**ONR LONDON CONFERENCE REPORT**

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16TH INTERNATIONAL SYMPOSIUM ON APPLIED  
MILITARY PSYCHOLOGY

MARSHALL J. FARR\*

31 December 1980

\*Office of Naval Research, Arlington, VA

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This report summarizes the presentations made at the 16th International Symposium on Applied Military Psychology held in Amsterdam from 19-23 May 1980. Departing from previous conference formats, which had one dominant theme, the 1980 symposium emphasized profound discussions of many specific topics. These included the psychological stress of military life, psychological dysfunctioning, evaluation of officer selection systems, attitudes of male officer cadets towards female officers, and the ingredients of heroism.		

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## 16TH INTERNATIONAL SYMPOSIUM ON APPLIED MILITARY PSYCHOLOGY

This report attempts to summarize the presentations made at the 16th International Symposium on Applied Military Psychology. These informal meetings, sponsored by the London Branch Office of the US Office of Naval Research, are held annually in order to stimulate, expand, and enrich military psychological research by exchanging unclassified research ideas and results. The subject meeting was hosted by the Interservice Committee of Sociologists and Psychologists of the Netherlands Ministry of Defense and was held from 19-23 May 1980 at the historic Kweekschool voor de Zeevaart (a navigation training college for the Merchant Navy), overlooking the harbor of Amsterdam. The 28 delegates attending were from 14 countries, mostly in Western Europe; however, the United States, Canada, and Israel also were represented. (A complete list of attendees is included as Appendix A.)

Dr. L.J.M.G. Erkens, chairman of the Dutch Interservice Committee of Sociologists, assisted by Maj. Eric E. Warlicht, was the organizer of the meeting, and Erkens also served as general chairman. Various participants took turns chairing specific sessions of the symposium.

In recent years, this series of meetings typically was organized around an overall theme. For the 1980 symposium, the Netherlands, as host nation, decided to forego one dominant theme and, instead, to emphasize more profound discussions, concentrating on one or two specific topics each day. These included the psychological stress of military life, selection of pilots, attitudes of Canadian male officer cadets towards female officers, the mental quality of US military personnel and the ingredients of heroism in the Israeli armed forces. Although some of the participants had difficulty understanding English, which was the language used at the meeting, a great deal of useful information was exchanged in a very cordial atmosphere.

Erkens made introductory remarks, pointing out that, in the Netherlands, social scientists now functioned in many roles: as advisors to management, as professional researchers, and as personnel managers who not only developed and applied personnel policies, but also forecast the effects of management decisions.

### Individual Counseling

Col. J.W. van Neden, chief psychologist of the Dutch Army, gave the first technical paper of the meeting. Van Neden, a clinical psychologist but not a therapist, spoke about individual counseling of the Army NCO corps. In 1973, the psychological dysfunctioning of an alarming number of NCOs in one brigade led to an inquiry which began in late 1974, to evaluate the attitudes of the NCOs. It was hypothesized that, if the organizational situation was the main cause of the dysfunction, there should be differences in perceptions, feelings, and meanings about organizational matters between those who functioned well and those who did not.

Van Neden and his colleagues set up two groups for study. Two hundred NCOs from another brigade were used; 100 well-functioning subjects, randomly chosen, were compared to 100 dysfunctional NCOs who were designated by the professional staff. The subjects were interviewed on their attitudes and perceptions. Surprisingly, no significant differences were found in how the two groups viewed the organization. In fact, both groups shared unhappiness in the job and

had a number of similar complaints. Some of these complaints were: (1) too much regulation, (2) inadequate communication at all levels, (3) a poor working climate and a poor relationship with peers and bosses, and (4) lack of a good man-job match in terms of education and training required by the job.

These complaints were not surprising: they had been found in a 1974 study and were again encountered in an investigation, completed in 1980, of why NCOs left the Army. Although these findings provided no adequate explanation of the major differences in the mental functioning between the groups, some differences were found. Most of the dysfunctional group had problems related to family, sex, alcohol, overstrain, and interpersonal relationships.

As a consequence of this study, methods for improving the situation were developed and tested in 1975. For example, counseling and psychotherapy were administered to 44 dysfunctional NCOs and 16 dysfunctional officers. What van Neden considered "remarkable results" were obtained in which, "...after 6 months, almost the whole group was ready for service again." Based on this successful tryout, the social service aspects of the Army organization were expanded to provide for more individual psychological counseling.

Although the mental health status of the Dutch army has improved, there are still some pervasive problems to be solved: (1) many commanders think that their responsibility is being diluted and, therefore, they resist the notion of individual counseling, (2) many of those who seek help are deceiving the system because they do not need the help, and (3) not all the professional counselors are well trained.

All in all, however, the new opportunities for individual counseling, in conjunction with new problem-solving procedures stemming from the study, have been very promising. Officer turnover has decreased. A survey feedback system was begun in 1978 in order to provide commanding officers with frequent and regular information about soldier satisfaction and complaints. And the training of personnel officers now includes 10 extra days devoted to counseling and interviewing.

#### Officer Selection and Training

Dr. Friedrich Steege, of the FRG Ministry of Defense, discussed officer selection, education, and training policies in the Federal Armed Forces (FAF). The current philosophy about an officer's qualifications in the FRG is that the broadest possible educational background is desirable. However, there are still many who do not agree that a high-level academic education is as important as military knowledge and leadership skills. At any rate, there is presently a serious practical problem: the FAF cannot acquire enough qualified officers because of the high, competing demand by industry for engineering graduates. An additional problem exists because the military university has only 3 years to cover the same work for which a private university allows 4 years. (It was recently decided to add 3 months to the 3-year military course.)

This 3-year period at a university is the second phase of officer training. (The first phase begins with 15 months of basic training at officer candidate schools of one of the military services.) During the 3-year second phase, candidates are promoted to "first officer rank." Following their university education, officers enter the third phase: training at schools run by their service for further active assignment.

How do the FAF select their officers? Steege stated that the Germans, since the early 1920s, pioneered in the use of the comprehensive selection strategy which H.A. Murray later popularized under the name of "assessment center" techniques, and which was applied by the US Office of Strategic Services in World War II. The basic officer selection procedure in the FAF has not changed substantially since the 1920s. It now consists of psychometric tests (measuring intelligence factors and general knowledge), written essays, a selection interview, a leaderless group discussion, some group tasks, and a brief prepared speech by the applicant. An examination committee (consisting of two officers and a psychologist) rates the performance with respect to one of four aptitude grades; the first three differentiate the passing candidates, whereas the last signifies failure. The current selection ratio, Steege pointed out, is such that one out of three officer candidates enter the Forces.

At present, the Ministry of Defense is awaiting more data before making any significant changes in the selection and training of its officers. Modifications being considered include: (1) establishing a regular career pattern for officer candidates without mandatory university studies, and (2) augmenting the 15-month first phase of officer training with practical leadership-skills training.

Steege's talk prompted some interesting discussion. Farr remarked that, in the US, officers typically have at least a 4-year university education from a military academy or a civilian university, and that officers are encouraged to take graduate courses and degrees as they move up the career ladder. Stoll stated that Swiss officers come only from the enlisted ranks. And Gal pointed out that Israeli officers generally must have about 15 months of enlisted service before they can enter OCS. Subsequently, most Israeli officers take university-level courses in private universities.

#### Evaluation of the British Army Officer Selection System

Roger Miles, representing the UK Army Personnel Research Establishment (APRE), stated that the main method of selecting officers for the British Army has operated virtually unchanged for over 30 years. The Regular Commissions Board at Westbury selects officers for all types of commissions by means of a series of tests, interviews, and group and individual exercises. It is an early example of the assessment center method of selection (the same procedure that Steege referred to in his presentation).

The procedure is firmly based on psychological principles, but is operated by experienced Army officers. Psychologists have not been members of the board since 1946. Today the psychologist's role is to function as researcher and adviser to the president of the board. In 1978, psychologists from the Army Personnel Research Establishment (APRE) were heavily involved in a major review of the board's tests and procedures. As well as assisting with a wide-ranging examination of the appropriateness and practicality of the current testing system, the psychologists undertook specific studies of the reliability, validity, and acceptability of the current system.

The review concluded that the basic system was sound and should be retained; it met the Army's requirements and was seen as fair and relevant by the candidates, Army officers, and visiting civilians. Moreover, in a formal experiment it was shown to have high reliability. A preliminary small study also showed an encouraging level of predictive validity. Since 1978, APRE psychologists have been consolidating and extending the research begun during the review. They hoped to conclude this work by the end of 1980.

### Self-Evaluation in Officer Selection

Commandant Arnold Böhrer, who is involved in recruitment and selection for the Belgian Army, spoke on the use of self-confidence ratings and personality inventories. He acknowledged that peer evaluation has certain strengths, but pointed out that one's self-evaluation already reflects, in part, what someone believes others (both superiors and peers) think of him. Questionnaires about oneself are used to measure a number of traits such as "ascendance, sociability, emotional stability, etc." The usual procedure is to have the subject interviewed by a psychologist after the subject has filled out a set of questionnaires. The psychologist tries to organize the information from several sources (for example, facts from the person's history and biography, the questionnaires themselves, and the behavior of the subject during the interview).

Böhrer discussed a study which was done to try to improve the evaluation process for selection purposes. The improvement consisted in having the subject participate in a more active way, namely by "asking him to evaluate himself considering a set of important characteristics." A comparison was then made, using officer candidates, of this particular self-evaluation with the judge's overall evaluation. At the same time, the self-evaluations were compared with self-reporting inventories for the same candidates.

Results in general showed that the experimental self-evaluation technique (which Böhrer termed "synthetic self-evaluation") had the potential for being useful in selection decisions. For example, using 200 candidates, the synthetic self-evaluation technique was compared to the evaluations made by a selection committee of 5 officers. The comparison was made for 6 traits: decisiveness, leadership, dynamism, responsibility, initiative, and sociability. The correlation coefficients were highly significant for all of the traits.

Böhrer suggested that useful information could be gained by finding out the reasons for differences between the evaluation techniques. He also pointed out that, until now, no definition of the traits had been given to applicants; and he proposed that a common definition be given to both judge and applicant to improve the evaluation process.

### Organizational Stress and Military Life

The presentation by Dr. Stracca, a psychiatrist with the Section of Applied Psychology in the Italian Ministry of Defense (Navy), dealt with a study of officer candidates taking a 40-day preparatory "training course" at the Italian Naval Academy in Leghorn for entrance examinations to the Academy's regular courses. Using Gough's adjective checklist and the Ego Strength scale of the popular Minnesota Multiphasic Personality Inventory (MMPI), personalities were compared of candidates who resigned from the training course and those who remained at the Academy up to their commissions as officers. The main reason for leaving given by the majority of candidates who resigned was an inability to adjust to the military life.

An additional personality measure used by Stracca derived from two new experimental scales obtained through an item analysis of the MMPI scores of subjects who were successful in the Academy and those who, although admitted, subsequently resigned. These two new scales were called S(success) and M(motivation). Results with the MMPI showed that both these scales, as well as the Ego Strength scale, showed significantly higher means for the group staying at the Naval Academy as compared to subjects who dropped out. To Stracca, these findings highlighted the

need for "better stability" of the Ego to overcome the unusual stress of the military culture.

#### Organizational Stress

Dr. Nico van Dijkhuisen, a Dutch Navy lieutenant who heads the Bureau of Organizational Behavior, spoke about organizational stress, as opposed to combat stress. He pointed out that his interest was in daily, routine stress, which can, when mild, be motivating and positive. The research data he reported on came from a study of middle management in a range of small to large private businesses in the Netherlands.

Van Dijkhuisen called positive stress "eustress"; negative stress was termed "distress." He emphasized that not all people find a given job situation stressful, and that a given individual may not find the same job situation stressful at different points in time. This is because distress occurs when the abilities of a person are not congruent with the demands of the job environment, or when clear obstacles exist to the fulfillment of one's needs or values.

In an effort to look for "stress centers" in an organization, a special questionnaire for organizational stress was used. It measured 13 stressors and 16 strains present in a particular situation. Stressors which shared a common dimension were grouped together into "stress factors." The stress factors underlying most work situations were found to be ambiguity, workload, and poor relations with others. The ambiguity factor comprised the stressors of role ambiguity, lack of support from the immediate superior, tensions in relations with superiors and subordinates, and job-future ambiguity. This stress factor correlated closely with certain psychological/physiological "strains," such as psychosomatic complaints, higher blood-cholesterol level, psychological complaints, more than average absenteeism, and high blood pressure.

High workload turned out to correlate with psychological and psychosomatic complaints as well as with high blood pressure, but these correlation levels were not as large as those of the ambiguity factor and the symptoms or complaints that accompanied it.

In terms of stressors, the stress factor of poor relations with others comprised lack of support from colleagues and others at work, lack of participation, responsibility for persons, and tensions in relations with other departments. Exposure to this particular stress factor correlated well with more job-related threat, more job dissatisfaction, and more psychological complaints.

Van Dijkhuisen's data were part of a cross-sectional study, but he emphasized that there were four studies in progress at the University of Leyden gathering longitudinal data twice a year on psychosomatic symptoms.

In summary, van Dijkhuisen's research was directed at constructing a sequential, hierarchical model of stress and the buildup of different reactions to stress, starting with minor feelings of dissatisfaction, and leading to psychosomatic symptoms and actual illness.

#### Legislation on Conscientious Objectors

Dr. Klaus Puzicha, of the Institute of Psychological Service of the FRG armed forces, discussed the influence of social-psychological research on military policy bearing on conscientious objectors (COs). Such research has been prompted recently by the need to provide information for reform of legislation on COs.



Youths from 15 to 18 years old who indicated their intention to claim CO status were asked whether they would trade such a claim for various forms and lengths of civilian alternative service. For example, 50% said they would "change sides" if the civilian alternative service had to be spent far away from home. If the disadvantages of all the civilian service alternatives were combined, only 20% of potential COs would still insist on claiming CO status. The educational background of the respondents clearly played a role in the degree to which they would persist in their CO-status claim in the face of various alternatives.

At the time of Puzicha's talk, legislation was pending in the FRG which was based on the data he described. He expressed optimism that this breakthrough in the practical utilization of social-psychological research findings would mark the beginning of a new acceptance of the importance of such research by the military authorities and the federal government.

On the same topic, Stracca pointed out that, in his country, philosophical, moral, or religious reasons presented 60 days before a person is due to be conscripted can lead to CO status. For such status to be approved, a majority of a 6-member commission must rule in his favor. It is very difficult to get such approval, and if it is obtained, one has to spend 24 months in alternative civilian service (as compared to 18 months for the conscript).

#### Psychological Services in the Portuguese Armed Forces

Capt. Manuel de Oliveira Santos of the psychological services of the Portuguese Air Force, briefly sketched the role of psychologists in his nation's military organization. Psychology first came of age in the armed forces about 1960, brought on by a recognition of the need to begin systematic, scientific personnel selection and classification. Today, Air Force candidates must take exams in three areas: "intellectual aptitudes, personality, and psychomotor tests." A system has been set up to compare the psychological adjustment and turnover history of personnel with the profile portrayed by the three composite exams. How well the service members do in their military training courses is also compared to each of the entrance tests in order to get further criteria for validation of the tests.

In an effort to improve psychological services and research and development in the Armed Forces, meetings were held among representatives of the Portuguese Air Force, Navy, and Army. The participants soon reached the conclusion that a "bureau of psychological research of the whole Armed Force" should be created, "whose investigators will belong to the three branches of our Armed Forces." Santos stressed some of the advantages of such a centralized operation: cost and time savings, an increase in scientific rigor, and the ability to attack problems that no single service could handle by itself.

#### Characteristics of Heroism

This report, by Lt. Col. Reuven Gal, head of the Unit of Military Psychology, Israel Defense Forces (IDF), was especially interesting in that it dealt with a topic not studied very much in the behavioral and social science literature: unusual, heroic acts in battle. The subjects whose heroism was analyzed were 283 Israeli soldiers who had been decorated with the Medal of Honor for feats of unusual bravery in the 1973 war with Egypt. Each case of heroism was examined carefully with regard to the individual factors that characterized the involved persons, and with regard to the situational factors related to the various circumstances under which the heroic act occurred. Three classes of variables were examined.

(1) Biographical background. These included age, physical fitness, place of birth, and origin.

(2) Military background. These included:

(a) General Quality Score (GQS). This is an index, called the "Kaba," used for general selection into the Israeli Armed Forces. It is comprised of four measures: IQ, level of education, degree of command of the Hebrew language, and a motivation index. Although the GQS, as a single score, is a general indication of the person's quality, Gal found it necessary to analyze separately the intelligence and motivational components (ONRL Report C-12-79, pp. 12-13). The intelligence-measure, called the Primary Psychotechnical Rating (PPR), ranges from 10 to 90, "and is derived from a version of Raven's Progressive Matrices and an Otis-type verbal test." The PPR comprises about one-third of the GQS. The motivation measure is an index that varies between 8 and 40 and reflects the motivation to serve in the army, especially in combat units. This index is derived from a semi-structured interview given to all recruits before their enlistment.

(b) The number of military courses which the individual had completed during his military service.

(c) The average of the scores obtained in the various military courses taken.

(d) Absent Without Official Leave (AWOL) frequency.

(3) Personality evaluations. Some of the recipients of the medal either were commissioned officers, or had at least been candidates for the Officers' School, and thus had been interviewed by trained psychologists. Based on the 77 available files for these individuals, scores on the following characteristics were used: leadership, social intelligence, decisiveness, sociability, devotion to duty, perseverance under stress, and emotional stability.

Scores on the first two groups of variables—the biographica and the military background—of 51 of the award recipients group were compared with the same scores obtained from 153 individuals in a control group matched by unit, rank, and job position. For a control with respect to the personality evaluations variable, the scores of the Medal of Honor winners were compared to a set of mean scores from a random sample of 300 soldiers who had passed the officer selection base examinations in 1975.

Included in the study was an evaluation of the situational variables which might have provoked the heroic action. Three experienced military psychologists independently evaluated the detailed descriptions of the acts of bravery and ended by establishing 12 distinct categories of situational characteristics. These included: a few against many, face-to-face combat, being surrounded by enemy, saving the lives of others, and whether the action ended in the hero's death.

Gal's conclusion from the data analyses and statistical comparisons was that this set of "heroes," "do not form any unusual, or deviant group; certainly not a group of 'supermen'." However, in some respects, they were statistically different from the controls. For example, in the personality evaluation, they appeared to be slightly more devoted to duty, more decisive, more persevering under stress, and possessed of somewhat higher leadership capacity. But, all in all, Gal emphasized, this study "did not yield a clear, distinctive profile of the Medalists... Israeli heroes, then, are not any distinct species. Apparently they are not born heroes—they become ones." More importantly, Gal pointed out that his analyses indicated there was little chance of predicting who, among a specified group of people, would behave heroically under certain circumstances. What could be concluded was that the situational variable interacted with the personality variable to produce the act of extreme bravery. In fact, Gal asserted that his results

supported the general proposition that, as a situation becomes more stressful and dangerous, there will be more circumstantial-related factors than person-related factors that will account for the heroism.

#### Time-Sharing, Automaticity, and Strategies

The next topic, time-sharing behavior, constituted a change of pace from the other papers presented at this meeting. Niels Busch-Jensen (Danish Defense Center for Leadership) discussed this topic after pointing out that he had no research data of his own to report. In essence, he gave a selected literature review. (Much of the recent important research in this area has been conducted under contract to the US Office of Naval Research (ONR) and the US Air Force Office of Scientific Research (AFOSR). The development of modern technology has led to an increasing number of situations in which the human operator, frequently working under time pressure, has to time-share, that is, do two things simultaneously. A key issue in this area is whether time-sharing is a unitary, isolable ability or whether it is an aggregate of a number of different sub-abilities. A related question is whether individual differences in time-sharing success are due to differences in time-sharing ability, or to differential ability in one or more of the component tasks taken alone. These questions become important, for example, when one faces the practical job of training people in time-sharing tasks, or of predicting which individuals will be superior in such tasks.

In recent years, experimental research on this topic by a number of investigators using a variety of component tasks has produced contradictory results. Some researchers found no evidence for a unitary time-sharing ability; others have found some evidence that there is "a reliable source of variance that contributes to performance of complex tasks, but is independent of single-task performance of the constituent task." One US investigator was able to demonstrate improvements in dual-task performance, as a function of practice, that were above and beyond concurrent improvements in single-task skills.

Busch-Jensen suggested that the contradictory results shown by the experimental-psychology literature may be due to the different tasks and conditions used, since the amount of common elements between tasks may be the crucial factor. He went on to suggest that we may obtain more useful information in this area by investigating more complex, real-life skills such as flying an aircraft or controlling it from the ground. In this regard, he stressed the relevance of what he considers "...two groups of more complex phenomena: (1) automatizing of skill, and (2) strategies in skill application." Automatizing of skills refers to the process whereby less and less conscious attention needs to be devoted to performing a task; the task thereby becomes smoother, more precise, and better coordinated. For example, ONR-sponsored research by Harold Hawkins and his colleagues at the University of Oregon found strong evidence that, with training, the processing limitation linked with response retrieval from memory disappeared due to automatization of the retrieval process. Busch-Jensen concluded his discussion of automatization by speculating on whether "very complex, high-order mental skills," as well as low-order skills, can be automatized, as some anecdotal evidence suggests.

"Strategies," which Busch-Jensen conceives of as "meta-skills," applying to whether an individual does serial or parallel mental processing in a time-sharing task, are another important area to investigate. Again, he brought up the problem of the real-world complex task (such as piloting a high-performance aircraft) in comparison to the typical, relatively artificial, laboratory task. In the former kind of task "...it is unquestionably clear that information over-

load is imminent that a serial processing strategy is absolutely necessary." Busch-Jensen asserted that it was necessary to predict what strategies individuals will employ in the face of different time-sharing demands. He therefore called for the development of dynamic tests (that is, tests other than the static paper-and-pencil types) in which the candidate is required to demonstrate processing strategies appropriate to the task at hand.

#### Personality Factors in Pilot Selection

Dr. Jacques Bremond (Chief of Medicine, Psychological Research Center, French Air Force) stated that several attempts some years ago to use psychiatric assessments as the base for pilot selection were abandoned because there were too few psychiatrists available to examine properly more than 1,000 candidates a year. In 1973, based on the assumption that candidates would fall in a continuum from normal to pathologic personality, a 115-item questionnaire was designed which could be given in less than one hour. The questionnaire was validated by being given to candidates recruited from 1973-1975 who were considered "normal" because they did not present any symptoms of mental disease. Nine scales containing from 5 to 8 items each were constructed: anxiety, depression, hysteria, psychosomatic symptoms, schizoid tendencies, paranoia, obsession, psychopathy, and a validity scale to check on whether subjects were lying.

This questionnaire was first used to identify individuals for psychiatric referral. However, a validity study revealed that paranoia and lying correlated negatively with flight success, whereas hysteria, paranoia, schizoid tendencies and lying "correctly foretold voluntary withdrawal" from flight training. An intriguing finding was that some anxiety and obsession favored success in flying school. A particularly useful result of the validity study was the fact that, if scores on this personality test were combined with those on the "psycho-technical" (ability and aptitude) selection tests, the coefficient for predicting voluntary withdrawal would be as high as .51.

#### Attitudes of Male Officers Towards Female Officer Cadets

At the previous conference of this series held in Israel in May 1979, Maj. Terry Prociuk (Royal Military College, Kingston, Ontario) discussed the attitudes of male cadets at his college towards the introduction of women as officer cadets. (See ONRL Report C-12-79, pp. 11-12). In the 1980 conference, LCDR Donald Lang, Head of the Department of Military Leadership and Management at Royal Roads Military College in Victoria, British Columbia, reported on a follow-up study, conducted at the Royal Roads facility, as part of a Joint Canadian Military College Survey, with Prociuk as the senior researcher. This study, an extensive attitude survey, had been conducted just two weeks earlier, and Lang cautioned that "...the data have not been thoroughly examined and that, indeed, there may well be some errors in what I have shown you."

Data were reported on a 10-item questionnaire taken by first and second year cadets regarding their attitudes about the introduction of female officer cadets into the military college system. (Although no women are scheduled to enter the Royal Roads College until 1983, the other two Canadian military colleges had women scheduled for a September 1980 start.) On most of the variables measured, the cadets were essentially neutral. However, they were not neutral with respect to the following: they thought that the female cadets would have a rather strong negative effect on overall discipline, but would benefit the social life of the college and the level of academic performance. Furthermore, the cadets expressed "some negative feelings" regarding the influence of females "on matters of *esprit de corps* and pride in being a military college cadet."

### Expanding Women's Roles in The Canadian Armed Forces

In a kind of companion piece to that given by Lang, Maj. Robert Walker, Staff Officer for Personnel Selection of the Canadian Air Command, reported Canada's plans with respect to the utilization of females in Canadian military organizations. The rights of women in Canada are now guaranteed by the Canadian Human Rights Act (CHRA), which was passed in early 1978. One provision of that act prohibits discrimination in employment (and this applies to the Armed Forces) on the basis of sex unless the employer can establish that the discriminatory practice is based on a *bona fide* occupational requirement. Prior to the enactment of the CHRA, the Canadian Forces (CF) had excluded women from service in combat and near-combat trades and classifications, from sea duty and aircraft duty, and from some isolated, all-male locations. The present level of women in the CF is about six percent.

Recently, the CF decided to sponsor separate 5-year programs, called trials, to assess the impact of servicewomen employed in (1) a non-combat ship's company (sea trial), (2) a previously all-male remote station (isolated trial), (3) field units involved in combat-services support operations (land trial), and (4) non-combat operational flying units as aircrew (air trial). These trials are being designed so that comparisons can be made of the relative effectiveness of individual males and females and of mixed groups of males and females. The trials will also allow the CF to assess the behavioral and sociological impact and to determine the degree of acceptance by the Canadian public and by Canada's allies, of service women in non-traditional role employment.

In these trials, sociological/behavioral scientists will gather the empirical and other data required and establish "methodological principles and techniques for a credible evaluation." In general, all females considered for trials employment are being administered questionnaires on attitudinal and biographical information. For the initial stages of the trial period, female participation is voluntary. Plans are currently being made to ensure that identical questionnaires are given to noninvolved (control) groups. (Trials were in their preliminary stages at the time of Walker's paper, and females were expected to be on site in fall, 1980.)

### Mental Quality of Military Personnel: Facts, Theories, and Remedies

In the final talk of the meeting, Dr. Edwin G. Aiken, program director for performance measurement and enhancement of the US Navy Personnel Research and Development Center, San Diego, California, reported on several ongoing research efforts aimed at improving the utilization and effectiveness of lower mental-ability (LMA) personnel. After making the point that US military forces are facing a decline in both the quality and quantity of available volunteer personnel, Aiken pointed out that the manpower problem can be attacked along two fronts: "Can we somehow change the nature of military tasks such that personnel with less ability can manage them? Or, alternatively, can we devise training programs that will, in economically feasible ways, raise the required skills of these less able people?" Then he described two projects aimed at people, and two focused on tasks.

(1) The JOBS program. This refers to Job-Oriented Basic Skills training, an attempt to remedy deficiencies in reading, mathematics, and study skills in LMA personnel by training them in the specific skills and knowledges needed for a specific occupational category. For example, if a given Navy job requires only that the incumbent be able to locate and record a certain type of information, then the training emphasizes that skill and devotes little, if any, time to de-

veloping other reading skills. The JOBS exercises are drawn from the particular occupational area being targeted. In this way, the concepts, and even the vocabulary of the student's field are acquired in conjunction with the development of his underlying comprehension skills. The JOBS curricula, unlike most remedial programs, grew out of a careful task analysis, supported by diagnostic testing of samples of the target population.

Those personnel meeting the selection criteria for JOBS training in general do not qualify for the Navy's entrance-level technical schools (called Class "A" schools). These introductory technical schools require that successful candidates for admission achieve certain scores on the Armed Forces Qualification Test (AFQT), which is composed of selected subtests from the Armed Services Vocational Aptitude Battery (ASVAB). This latter test is a major selection and classification requirement for all enlisted personnel for all services.

Aiken stated that there had been some experimental verifications that the JOBS program is effective. JOBS personnel for the occupational area of engineering did succeed, for the most part, in reaching desired performance levels in the remedial training intended to prepare them for "A"-school work.

To evaluate how well performance on the engineering specialty in JOBS training prepared personnel for the Engineering "A" school, their attrition rates in "A" school were compared to those of two other groups. The first comparison group had aptitude levels roughly equivalent to the JOBS students, had had no preparatory skill training, but had been admitted to class "A" schools under special dispensation. The JOBS group showed substantially less attrition than this first comparison group.

The second comparison group consisted of students who had qualified for "A" school by attaining a high-enough AFQT score. JOBS students showed an 11% higher drop-out rate from the "A" school than this second comparison group. However, the first comparison group had a 40% higher drop-out rate than the AFQT-qualified group.

(2) Automated instruction. In this second kind of project aimed at people, the target individuals were, first, the least literate English-speaking recruits, and second, those US citizens for whom English was a second language—mostly Filipinos and Hispanics. The focus with these groups was much more on training for survival and safety than for a technical occupation. The training-program objectives were to raise each student's typical initial English reading-grade level of 4.5 to a 6th grade level, as well as to develop some elementary study skills. To accomplish this training, Aiken and his associates developed and tested an automated English-language phonics program which made extensive use of a speech synthesizer. Although the computer software was not highly sophisticated, it turned out to be as effective as a human instructor.

The next development was to use a computer to teach vocabulary; for this, the researchers drew on the basic research findings of ONR contractors and others concerning semantic network theories of the organization of linguistic knowledge. This theoretical work was used to compile the computer's memory and to write the logic for the instructional branching. The speech synthesizer was under computer control, and the computer data base possessed English to Tagalog (Filipino) and English to Spanish dictionaries. Results for this automated vocabulary learning revealed that the computer-taught students learned three times faster and retained what they had learned three times better than conventionally taught students.

(3) Producing comprehensible text. Aiken described an ongoing approach to dealing with less able military personnel by changing the nature of their jobs—in this case, redesigning the written material they had to understand and use in their occupational specialties. In this project, three competing US firms recently modified samples of Navy technical text, and each firm produced three new versions in which either the text, the graphics, or the format was changed while the other two variables were held constant. Each organization had also kept a diary, listing all the modifications made, and the rationale for each one. At the time of Aiken's presentation, the comprehensibility of each modification was being evaluated. The accompanying diaries should give clues as to the most effective document-design strategies. The ultimate goals of this line of research are the development of technical writer guidelines, a technical writer's course, and an objective writing index for contractual enforcement purposes.

(4) Job-performance aids in career training. This direction of research involves essentially making the job easier for less able personnel by providing them with Job-Performance Aids (JPAs). Such aids are formally defined as "any information-based guide, document, or device used on the job to facilitate performance." Examples of JPAs include maintenance requirement cards, a pre-flight checklist, and a hand-held calculator. By storing information that usually has to be memorized or inferred, JPAs can reduce total training time and especially the need for training that requires theoretical or system understanding. The increased use of a larger variety of JPAs holds promise for allowing minimally trained and/or lower-aptitude personnel to carry out fairly complex functions.

A major obstacle to the widespread use of JPAs in the US military has been the criticism that it makes the JPA-assisted technician a robot who cannot successfully deal with problem situations not specifically anticipated by any JPA. An experimental Navy program just getting started (called EPICS, for Enlisted Personnel Individualized Career System) attempts to reduce this criticism through an approach to the development of a technician that combines special formal training with on-the-job performance, using JPAs which are progressively less prescriptive and thus require that the user, as he gains experience, rely more and more on his own knowledge and problem-solving ability, and less and less on the JPA.

The US Navy has an experimental plan to move a JPA-dependent apprentice through successive on-the-job and resident-training experiences until he reaches the stage of full system technician; after that he will work with conventional technical manuals to solve problems requiring full system understanding. A 4-year follow-up is planned to evaluate the EPICS concept, involving a total of 189 men and 45 ships. If successful, EPICS will be tried out in other Navy occupational areas which are expected to experience declines in the availability of higher mental-ability personnel.

APPENDIX A



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## ON APPLIED MILITARY PSYCHOLOGY

19-23 MAY 1980

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